

**REMARKS**

Applicants thank the Examiner for the very thorough consideration given the present application.

Claims 1-17 are now present in this application. Claims 18-20 are cancelled herein without prejudice to or disclaimer of the subject matter set forth herein. Claims 1, 12, and 14 are independent.

Claims 1, 4-6, 8-10, and 12-17 have been amended. Reconsideration of this application, as amended, is respectfully requested.

**Amendments to the Specification**

The specification is amended merely to correct minor informalities. No new matter is entered.

**Rejections under 35 U.S.C. §103(a)**

Claims 1-3, 7, 11, 14-18 and 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the Applicants' disclosed prior art (APA) in view of Ames et al. (U.S. 2,158,351);

claims 4-6 and 8-10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the APA in view of Ames et al., and further in view of Kapadia;

claims 12 and 19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Thurston et al. (U.S. 5,884,665) in view of Erickson (U.S. 5,452,994); and

claim 13 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Thurston et al. and Erickson, and further in view of Kapadia.

These rejections are respectfully traversed.

Complete discussions of the Examiner's rejections are set forth in the Office Action, and are not being repeated here.

**Amendments to Independent Claims 1 and 14**

While not conceding the appropriateness of the Examiner's rejection, but merely to advance prosecution of the instant application, Applicants respectfully submit that each of independent claims 1 and 14 has been amended to recite a combination of elements in a valve plate structure, including *inter alia*

wherein in a direction extending away from a center of the suction port or the discharge port of the valve plate, each successive one of the continuous grooves has an increasingly greater width than a width of an adjacent continuous groove disposed immediately inside thereof, whereby wherein vibration and noise in various frequency bands generated from the collision of the suction valve or the discharge valve with the valve plate are reduced.

Support for the novel combination of elements set forth in each of claims 1 and 14 can be found, for example, in the paragraph beginning on page 5, line 4, the paragraph beginning on page 7, line 16, and the paragraph bridging between page 7, line 24, and page 8, line 1 of the specification, and seen in, for example, in FIGS. 3A, 3B, 4, 5, 6, and 7.

The positive effects of novel configurations of the present invention are described, for example, in the paragraph beginning on page 7, line 16 of the specification, which recites "...spaces with various widths and respectively have the resonant frequencies pertinent thereto....", and the paragraph beginning on page 8, line 2 of the specification, which recites "The plurality of cavities 118 (continuous grooves) are formed in various widths to have different resonant frequencies, and thus can damp vibration and noise in various frequency bands". In particular, the Examiner is directed to FIGS. 3B and 4, which clearly shows different resonant frequencies in each of the adjoining continuous grooves in a direction extending away from a center of the suction port or the discharge port of the valve plate, each successive one of the continuous grooves having an increasingly greater width than a width of an adjacent continuous groove disposed immediately inside thereof.

By contrast, APA provides no suggestion whatsoever of continuous grooves.

Regarding Ames et al., the Applicants respectfully submit that this is a completely different structure. For example, as can be seen Ames et al. FIGS. 2 and 3, this document merely discloses concentric grooves 18 of the same width cut into the head of the piston 4 (rather than a valve plate). Further, the valve disk 7 of Ames et al. has no grooves. In addition, nowhere in Ames et al. is there any hint of in a direction extending away from a center of the suction port or the discharge port of the valve plate, each successive one of the continuous grooves

has an increasingly greater width than a width of an adjacent continuous groove disposed immediately inside thereof, whereby wherein vibration and noise in various frequency bands generated from the collision of the suction valve or the discharge valve with the valve plate are reduced (as set forth in independent claims 1 and 14 of the present invention).

Regarding Kapadia et al., the document merely describes a completely different configuration. For example, Kapadia et al. merely disclose a plurality of discrete depressions 18 cut into a valve seat 14, and a valve 10 extending over one side of the cylinder. Column 3, lines 1-2 of this document merely discloses "...a variable damping effect (of the flat valve) by varying individual depression geometry and volume". However, Kapadia et al. is deficient in numerous ways, including at least the following:

1. none of the Kapadia et al. depressions surrounds at least a majority of the outside of the suction port or the discharge port; and
2. there is no suggestion in Kapadia et al. that there was any understanding of the problem facing the present inventors, namely that of reducing noise by damping resonant different vibration frequencies in adjoining continuous grooves in a direction extending away from a center of the suction port or the discharge port of the valve plate, each successive one of the continuous grooves having an increasingly greater width than a width of an adjacent continuous groove disposed immediately inside thereof.

Regarding Dennedy, as cited in the previous Office Action, this document is also deficient as compared to the novel combination of elements set forth in claims 1 and 14.

In view of the deficiencies of each Ames et al., Kapadia et al., and Dennedy, no combination of APA, Ames et al., Kapadia et al., and/or Dennedy can suggest or achieve the effects of the present invention as described above.

There is no suggestion or motivation to combine the applied references.

Therefore, independent claims 1 and 14 are in condition for allowance.

With regard to dependent claims 2-11 and 15-17, Applicants submit that claims 2-11 and 15-17 depend, either directly or indirectly, from independent claims 1 and 14, which are allowable for the reasons set forth above, and therefore claims 2-11 and 15-17 are allowable based on their dependence from claims 1 and 14. Reconsideration and withdrawal of this art grounds of rejection is respectfully requested.

**Amendments to Independent Claim 12**

While not conceding the appropriateness of the Examiner's rejection, but merely to advance prosecution of the instant application, Applicants respectfully submit that independent claim 12 has been amended to recite a combination of elements in a valve plate structure, including *inter alia*

a continuous groove spirally provided to surround the outside of the suction port or the discharge port, the continuous groove being located beyond an edge of said suction plate or said discharge plate,

wherein a width of the continuous groove increases steadily as the groove spirals outward from the suction port or the discharge port, whereby vibration and noise in various frequency bands generated from the collision of the suction valve or the discharge valve with the valve plate are reduced.

Support for the novel combination of elements set forth in claim 12 can be seen, for example in FIGS. 9 and 10B.

The Applicants respectfully submit that the combination of elements as set forth in independent claim 12 is not disclosed or made obvious by the prior art of record, including Thurston et al. and Erickson.

By contrast, the Examiner concedes that Thurston et al. fail to disclose a spiral groove in a valve plate. As can be seen in Thurston et al. FIG. 2, a circular groove 34 is merely cut into discharge plate 16.

Further, as can be seen in Erickson FIGS. 5, 7, 8, and this document merely discloses depressions 130, 132, 140, 141, 142, 144, 146 cut into a piston 26 (rather than a valve plate), the depressions having equal widths and equal spacing between adjoining depressions.

In view of the above arguments, the Applicants respectfully submit that no combination of Thurston et al. and Erickson can teach or suggest the invention as set forth in independent claim 12.

Further, Kapadia cannot make up for the deficiencies of Thurston et al. and Erickson.

Therefore, independent claim 12 is in condition for allowance.

Claim 13 depends from independent claim 12, which is allowable for the reasons set forth above, and therefore claim 13 is allowable based on their dependence from claim 12. Reconsideration and allowance thereof are respectfully requested.

All claims of the present invention are now in condition for allowance.

### **Conclusion**

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding rejections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance.

If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone Carl T. Thomsen, Registration No. 50,786, at (703) 208-4030, in the Washington, D.C. area.

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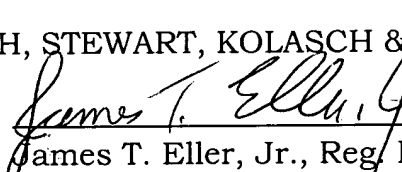
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Art Unit: 3753  
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If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit 02-2448 particularly, extension of time fees.

Respectfully submitted,

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